

CHAPTER 670 STRUCTURE APPROACH SLABS

Topic 671 – Application

Index 671.1 Purpose

The approaches to any structure, new or existing, often present unique geometric, drainage, pavement, and traffic situations that require special considerations.

Structure approach slabs provide a smooth transition between a pavement that is generally supported on a yielding medium (soil that is subject to consolidation and settlement) and a structure, which is supported on a relatively unyielding foundation (bridge).

These guidelines should be followed in the engineering of all structural approach slab projects involving new construction, reconstruction, or rehabilitation of structure approaches. They are not, however, a substitute for engineering knowledge, experience, or sound judgment.

671.2 Application

There are several alternatives that may be considered in the design of a structure approach slab system. These alternatives are designated as Types 14, 9, and 3 structure approach slab systems. Standard details and special provisions for each type of approach system can be found on the Structure Design page of the Division of Engineering Services (DES) website. Figure 671.1 shows a generic structure approach slab system layout. Structure Design Bridge Memo 5-3 provides the criteria for the selection and design of structure approach slabs. In the event of discrepancies between this manual and Structure Design Bridge Memo 5-3, Memos 5-3 shall govern.

Structure approach slabs extend the full width of the traveled way and shoulders. The DES will select the appropriate structure approach slab and provide applicable details, specifications, and an

estimate of cost for inclusion in the Plans Specifications and Estimates (PS&E) package. The project engineer (PE) must coordinate with structure engineer to assure that the proper structure approach slab is included in the PS&E package.

Structure approach slabs are used on all rigid pavements and on multilane flexible pavements located within designated urbanized areas. Urbanized areas are identified, by postmile, in the Route Segment Report, Project Management Control System (PMCS) Database and State Highway Inventory.

On new construction projects, overcrossing structures constructed in conjunction with the State highway facility should receive the same considerations as the highway mainline.

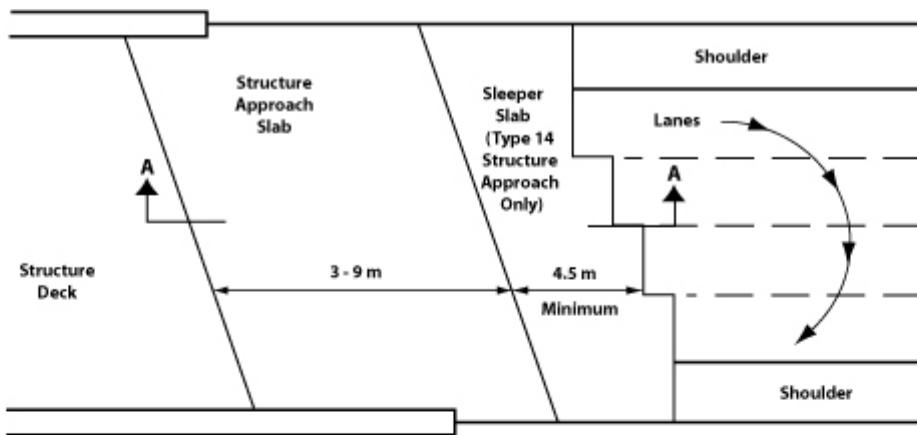
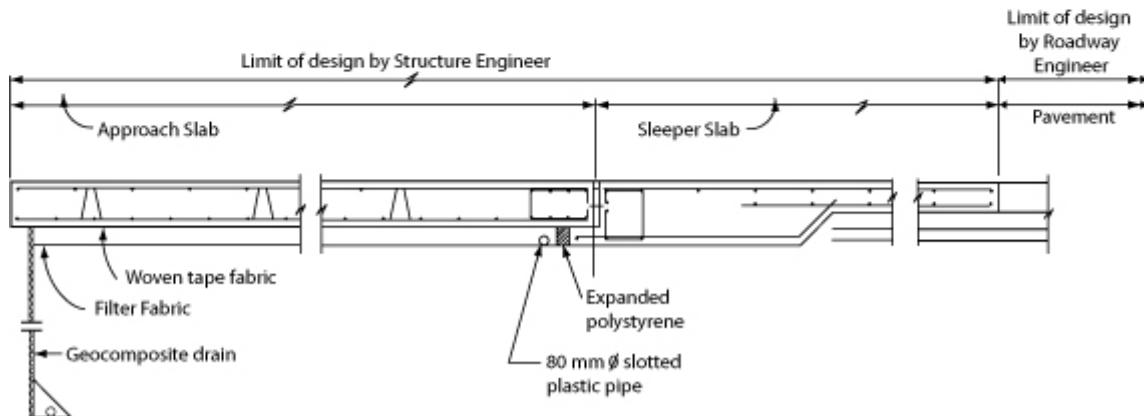
Topic 672 - General Considerations

672.1 Field Investigations

Adequate information must be available early in the project development process if all factors affecting the selection and engineering of a structure approach slab system are to be adequately addressed. A field review will often reveal existing conditions, which must be taken into consideration during the design.

672.2 Load Transfer at Approach Slab/Concrete Pavement Joint

No matter what structure approach slab alternative is being considered, it is recommended that dowel bars be placed at the transverse joint between the structure approach slab and new rigid pavement to ensure load transfer at the joint. If the structure approach slab is being replaced but the adjacent rigid pavement is not, a dowel bar retrofit is not necessary. The thinner of either the pavement or the structure approach slab will govern placement of the dowel bar at half the thickness of the thinner slab. The standard plans provide other details for transitions from the structure approach slabs to flexible pavement.

Figure 671.1**Structure Approach Slab Layout****Plan View****SECTION A-A**

672.3 Guardrails

The extension of the structure approach and sleeper slabs across the full width of the outside shoulder creates a conflict between the outside edge of these slabs and the standard horizontal positioning of some guardrail posts. Spacers are attached to the posts that conflict with the structure approach and sleeper slabs to move the postholes outside the edge of shoulder without changing the standard alignment of the guardrail. These details are covered by DES Standard Details and by the Standard Plans.

672.4 Barriers

On new construction, the structure approach slab extends laterally to coincide with the edge of structure. Any concrete barriers next to the structure approach slab will therefore need to be placed on top of the structure approach slab and part of the responsibilities of the structures engineer. The PE should coordinate with structure engineers to coordinate the limits and responsibility for barriers.

672.5 Structural Approach System

Drainage

(1) *Pavement Drainage.* Figure 671.1 shows the components of the positive structural drainage system. Filter fabric should be placed on the grading plane to minimize contamination of the treated permeable base (TPB) for all types of structure approach systems. The plastic pipe shall have a proper outlet to avoid erosion of the structure approach embankment. On all new construction projects, regardless of the type of structure approach, slabs provisions for positive drainage of the approach system should be incorporated into the design, see Structures Design Standard Details for requirements. The PE or the District Hydraulics Engineer are responsible for all drainage considerations of the roadway while DES, Structures Design (DES-SD) is responsible for structure related drainage. DES-SD is responsible for engineering of both the approach slab and the drainage

system, which normally exits through the wingwall. The highway engineer designs the collection and disposal system, which begins on the outside face of the wingwall.

- (2) *Surface Drainage.* Roadway surface drainage should be intercepted before reaching the approach/sleeper slab. The objective is to keep water away from the structure approach embankment. The surface water, once collected, should be discharged at locations where it will not create erosion. Refer to Chapter 831 for more information.

Topic 673 - Structure Approach Slab Rehabilitation Considerations

673.1 Approach Slab Replacement

Replacement of a structural approach slabs consists of removing the existing pavement, approach slab, underlying base and subsealing material (if applicable) and then replacing with an appropriate type of structure approach system. Depending on the thickness of the existing surface and base layers to be removed, the minimum 300 mm approach slab thickness may have to be increased. PE needs to make sure the structure engineer addresses this in their reports, plans, and specifications.

673.2 Structure Approach Slab Drainage

Typical details for providing positive drainage of a full-width structure approach system are shown in Figure 673.2. Cross drains are placed at the abutment backwall and at the transverse joint between the existing pavement and the structure approach slab by the structure engineer. A collector/outlet system is placed adjacent to the wingwall at the low side of pavement. The collected water is carried away from the structure approach slab a location where it will not cause erosion. The PE is responsible for the engineering of the outlet for the structure approach slab drainage. Storm Water Best Management Practices should be considered.

Storm water guidelines are available on the Division of Design, Storm Water website.

The structure approach slab edge details to prevent entry of water at the barrier rail face apply when the wingwalls and/or bridge barrier railing are not being reconstructed.

673.3 Pavement Details

Special pavement details are necessary when structure approach slabs will be replaced in conjunction with the crack, seat, and overlay pavement rehabilitation strategy for rigid pavement. Figure 673.3, which is applicable to full-width slab replacement, illustrates a method of transitioning from a 105 mm flexible pavement overlay thickness to a minimum 45 mm final flexible overlay thickness. Care should be taken in areas with flat grades to avoid creating a ponding condition at the structure abutment.

Cracking and seating of the existing rigid pavement as well as the geotextile reinforcement fabric should be terminated at the start of the transition from the maximum flexible pavement overlay depth.

Flexible pavement overlays should not be placed on structure decks and approach slabs without the concurrence of Structures Maintenance and Investigations (SMI). If an overlay is needed, SMI will provide the recommended strategy. If another strategy, such as polyester concrete is used, the details will be provided by either SMI or Office of Structure Design (OSD).

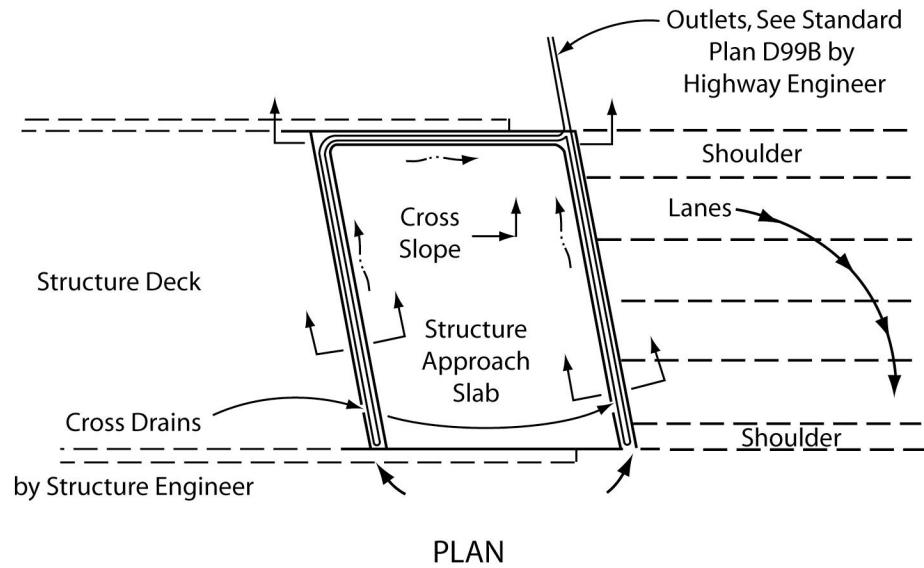
673.4 Traffic Handling

Traffic handling considerations typically preclude full-width construction procedures. Structure approach rehabilitation is therefore usually done under traffic control conditions, which require partial-width construction.

District Division of Traffic Operations should be consulted for guidance on lane closures and traffic handling.

When developing traffic handling plans for structure approach slabs, where replacing markings is necessary, and where there is a need

to maintain traffic during construction, the engineer should be aware that pavement joint should not be located underneath any of the wheel paths.

Figure 673.2**Structure Approach Drainage Details
(Rehabilitation)**

PLAN

Legend

- Direction of Flow
- CTB Cement Treated Base
- PCCP Portland Cement Concrete Pavement
- TPM Treated Permeable Material

Figure 673.3
Structure Approach Pavement Transition Details
(Rehabilitation)

